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BUSINESS IN THE KNOWLEDGE ECOSYSTEM: THE POTENTIAL OF PARTNERSHIPS FOR SMART CITY DEVELOPMENT

ABSTRACT

The article under consideration is devoted to the study of the possibilities of forming a knowledge ecosystem for Ukrainian business with the participation of Ukrainian business, which functions as a living system in which nonlinear and complex interaction between subjects occurs at all stages: from creation to transfer and practical use of knowledge. At each of these stages, business plays an important role, thereby contributing to the development of society, science, technology, economy, and other spheres. This ecosystem functions as a living system where the interaction between actors and knowledge is non-linear and complex, and occurs at all stages: from its creation to transfer and practical use. Each of these stages plays an important role in the development of society, science, technology, business, and other areas. The purpose of the present article is to analyse the forms, dynamics, and barriers in the interaction of businesses with local governments and higher education institutions (HEIs) in the context of smart urban development. The article's objective is threefold: firstly, to elucidate the motivations and reasons for businesses' limited interest in collaborating with authorities and educational institutions; secondly, to identify variations in partnerships based on the nature of the settlement; thirdly, to recognise the primary institutional and subjective barriers to effective interaction; and finally, to propose strategies to enhance business involvement in promoting the concepts of sustainable and intelligent territorial development. The article analyses the results of a survey of business representatives on the level of interaction with public administration, higher education institutions, and scientific institutions in the context of urban and smart development. It has been found that the overall level of cooperation between business and public sector institutions is extremely low, regardless of the type of settlement, although in smaller cities, there is a somewhat more active interaction, which is explained by better communication and local social ties. The key barriers to partnership are identified: lack of motivation, distrust of institutions, and focus on internal business needs. The author substantiates the need for institutional reforms, intensification of educational activities, and demonstration of effective practices in order to involve business in smart initiatives as an active subject of sustainable urban development.

Keywords: knowledge ecosystem, business, smart city, urban development, institutional interaction, higher education institutions, public-private partnership, change management

JEL Classification: O35, R58, I23, O18

INTRODUCTION

A knowledge ecosystem is a dynamic environment that encompasses all actors, resources, and mechanisms that facilitate the creation, transfer, and use of knowledge. It functions as a living system, where the interaction between actors and knowledge is non-linear and complex, and occurs at all stages: from its creation to transfer and practical use. Each of these stages plays an important role in the development of society, science, technology, business, and other areas. The basic provisions on the structure and sequence of knowledge ecosystem stages are well known.

Knowledge creation - this stage involves the generation of new information, innovations, or ideas. This process takes place through the collection, analysis, and synthesis of

information, research, and development. Knowledge transfer is the process by when the created knowledge is transferred from one entity to another. This can take place through: communication and learning (lectures, publications, trainings, seminars, online courses and other educational technologies), digital technologies and platforms (websites, databases, social networks), networking communities (professional conferences, business-to-business cooperation, interpersonal communications), experience exchange (scientific conferences, publications of research results, internships) to disseminate knowledge to a wide audience. Knowledge utilisation is the application of created and transferred knowledge to achieve specific goals. The use of knowledge takes place in a wide variety of areas and contexts. First of all, it is a practical application in the production process: new technologies, materials, and products. Knowledge is important for solving various problems: solving specific tasks, optimising processes, or increasing efficiency. Equally important is the use of knowledge to gain new knowledge, create new ideas, and develop new products or services. Knowledge creation - this stage involves the generation of new information, innovations, or ideas. This process takes place during the collection, analysis, and synthesis of information, research, and development. Knowledge transfer is the process by which the created knowledge is transferred from one entity to another. It can take place through: communication and learning (lectures, publications, trainings, seminars, online courses and other educational technologies), digital technologies and platforms (websites, databases, social networks), networking communities (professional conferences, business-to-business cooperation, interpersonal communications), experience exchange (scientific conferences, publications of research results, internships) to disseminate knowledge to a wide audience.

These stages - creation, transfer, and use of knowledge - form a single chain, where each stage is interconnected with the others. These stages do not just follow each other in sequence; they can also influence the previous stages. The use of knowledge can also lead to new ideas, become the basis for their improvement, or for new research and development. Practical experience can point out the imperfections of existing theories, methods, and technologies, thereby stimulating new research and development.

That is why a knowledge ecosystem is a much more complex phenomenon than a knowledge chain or even a set of chains. When we talk about a knowledge chain, we are talking about the logic of the process, the logical sequence of stages of knowledge creation, transfer, and use. In fact, the knowledge ecosystem includes many actors that can simultaneously operate at different stages of the chain. For example, universities and research centres are, by definition, at the beginning of the logical chain of knowledge creation. But they are also actively involved in all other stages. The use of knowledge in the real sector can also be accompanied by the creation of new knowledge and the dissemination of knowledge.

This underlines the importance of knowledge integration, ensuring effective interaction at each stage, in order to increase collective knowledge, its application, and further development. It is the effective integrated interaction between all stages that can ensure innovation and progress in various industries. The formation of an effective ecosystem is the most pressing issue in economic science and practice. What determines its effectiveness? Why do some ecosystems demonstrate a rapid breakthrough under the same conditions, while others are slow to move? What determines success to a greater extent: external, environmental conditions, or the ecosystem agents themselves? These questions are of interest to scientists in many countries.

The effectiveness of the knowledge ecosystem is influenced by two main groups of factors: first, the power of its main actors (educational and research institutions, business, government), and second, the effectiveness of all interactions between them in the process of creating, transferring, and using knowledge. On the one hand, it is very important that the knowledge creation process is provided with professional staff, modern high-tech equipment, materials, and premises. On the other hand, the system of interactions between the main actors is very important, as it affects the subject of research, the search for investors, and the speed of use in the production process. In order for new knowledge, technologies, or products to be implemented in production, a system of effective, consistent relationships, links, and mechanisms is required. Only systematic information, organisational, technical, and financial support can ensure this.

The key point to note is that today's comprehensive digital transformation is bringing about fundamental changes in the processes of knowledge creation, transfer, and use. Not only are these processes changing, but the actors themselves are also changing, as are the relationships between them. Most importantly, digital transformation can dramatically affect the efficiency of the knowledge ecosystem. New technologies, which are valuable knowledge in themselves and the result of the knowledge creation process, transform all processes and accelerate all transactions. The entire chain of knowledge creation, dissemination, and use is gaining new meaning and new opportunities.

Moreover, the development of digitalisation is becoming the basis for another process - smartisation. Digitalisation is a necessary precursor to smartification, as digital technologies are a factor that ensures the functioning of smart technologies. In general, both processes are aimed at improving the quality of life, resource efficiency, ensuring sustainable devel-

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opment and economic growth, as well as facilitating the adaptation of society to modern challenges and using the opportunities provided by advanced technologies. Together, the processes of smartisation and digitalisation are crucial for the development of modern society, as they improve the quality of life, optimise the use of resources, and ensure sustainable development. The key point to note is that today's comprehensive digital transformation is bringing about fundamental changes in the processes of knowledge creation, transfer, and use. Not only are these processes changing, but the actors themselves are also changing, as are the relationships between them. Most importantly, digital transformation can dramatically affect the efficiency of the knowledge ecosystem. New technologies, which are valuable knowledge in themselves and the result of the knowledge creation process, transform all processes and accelerate all transactions. The entire chain of knowledge creation, dissemination, and use is gaining new meaning and new opportunities.

LITERATURE REVIEW

The importance of knowledge for social development is very significant, and that is why these issues are actively studied by many scientists. The foundations of knowledge management in business were laid down in the works on 'the learning organisation' by P. Senge (1990) and D. Poroshyn (2024), 'collective knowledge or collective wisdom of the organisation' by J. Pór (2001), and 'Knowledge-Creating Company' by I. Nonaka (1995; Nonaka, 2000). As a result, such a direction in management as knowledge management and talent management was formed. Features and other aspects of the functioning of knowledge ecosystems are being studied: Verna Allee points to the power of knowledge, which is repeatedly strengthened with its dissemination (Allee, 1997); Wenbin Li et al. (Li, 2012) emphasise the self-organisation of the knowledge ecosystem as the environment changes. Vodă, A. I., Bortos, S., & Şoitu, D. T. (Vodă, 2023) consider the main attribute of a knowledge ecosystem to be the generation of new knowledge and valuable open solutions for participants that stimulate innovation, improve decision-making, and support learning and growth; Giedrius Jucevičius (Jucevičius, 2022) also links the knowledge ecosystem to the development of new knowledge; Kati Järvi identified two main ways of organising knowledge ecosystems: prefigurative and partial (Järvi, 2018).

Knowledge chains are the subject of research in the works of C.W. Holsapple, M Singh (Holsapple, 2001; Holsapple, 2003), where the links between knowledge management and competitiveness are investigated and a knowledge chain model is proposed, in which the organisation focuses on knowledge management to achieve competitiveness. J.-L. Ermine (2013) defines the knowledge value chain (KVC) as a continuum of knowledge processes that add new value at each step. This chain is based on the well-known but fuzzy DIKW hierarchy (Data, Information, Knowledge, and Wisdom).

Analyse the value chain in the field of strategic management in knowledge-based organisations, T. Almarabeh, A. Abuali, S. Alsharrab, A. A. Lasassmeh (Almarabeh et al., 2009). C. Gaimon and K. Ramachandran (2020), based on the systematisation of a significant amount of literature on knowledge management, developed the concept of the knowledge value chain. This chain is characterised as a transformational mechanism through which a firm can close various productivity gaps. K. Barner (2017) analyses how professionals and industries create a knowledge supply chain. The author emphasises the importance of the concept of 'quality' for the knowledge chain É. Bossé, M. Barès (Bossé, 2022) emphasises the importance of quality for the knowledge chain, as the goal is to improve performance through data, information, and knowledge quality.

The issue of building effective knowledge chains is extremely important, and therefore often becomes the subject of empirical research and sociological surveys. For example, L. Marinelli, A. Crupi, N. Del Sarto, and D. Lepore (Marinelli, 2024) study the creation of a knowledge ecosystem (KE) to support the digital transformation of MSMEs (micro, small, and medium-sized enterprises), their access to and investment in new digital technologies, and the role of knowledge brokers. A. Shirish, S.C. Srivastava, N. Panteli, and J. O'Shanahan (Shirish, 2024) investigated the role of digitalisation in improving the effectiveness of government initiatives to promote the digital transformation of microbusinesses. The study draws on qualitative data from a series of structured interviews and focus groups with government agents, digital leaders, and owner-managers involved in the implementation of the government's digital transformation programme for microbusinesses in Ireland. Three knowledge pathways are identified, which play different knowledge-related roles and are aimed at facilitating digital transformation: top-down, bottom-up, and multi-directional.

One of the key subjects of the knowledge ecosystem is business, which makes the problem of strengthening its role as a driver particularly urgent. Building an effective knowledge ecosystem is impossible without a powerful business. Of particular importance is the issue of researching effective forms of involving business in the processes of creating, transferring, and using knowledge, identifying obstacles and barriers, and developing tools to activate its role.

AIMS AND OBJECTIVES

The purpose of the article is to analyze the forms, dynamics, and barriers in building an effective knowledge ecosystem (business - local governments - higher education institutions) in the context of smart urban development. Accordingly, the article aims at clarifying the motivations and reasons for the low interest of businesses in cooperation with the authorities and educational institutions; identifying differences in partnership depending on the type of settlement; identifying the main institutional and subjective barriers to effective interaction; and formulating proposals for enhancing business participation in promoting the ideas of sustainable and smart development of territories.

METHODS

As part of the research project 'Smart imperatives of digital transformation of the knowledge ecosystem in the context of economic recovery in Ukraine', a survey of business representatives was conducted to assess their interactions with educational and scientific institutions, the public, and public authorities. The aim of the project is to study the effective digital transformation and smartification of the knowledge ecosystem as a basis for the recovery of Ukraine's economy on the basis of advanced digitalisation, intellectualisation, and sustainable development. That is why the main range of issues concerns cooperation between business, government, education, and research institutions in the framework of urban development and smart development. Nevertheless, the results are also indicative of the overall assessment of the level and state of cooperation between business and the government, and the education and research system. The survey was conducted by the consulting company Active Group and covered 300 enterprises throughout the country, except for the occupied part. The combined study included a quantitative component (self-administered questionnaires in the SunFlower Sociology panel) and a qualitative component (in-depth interviews with business representatives).

The methodology includes the following stages: 1) development of a questionnaire - key questions regarding the object under study; 2) conducting a combined survey: quantitative component (based on self-filling of online questionnaires in the "SunFlowerSociology" panel) and qualitative (in-depth interviews with business representatives); 3) generalization of the obtained data using mathematical and statistical tools; 4) analytical processing of the prepared data set and development of conclusions and proposals. The survey was conducted by the consulting company Aktiv-Group and covered 300 enterprises throughout the country, except for the occupied part.

RESULTS

In the modern economy, knowledge is a key resource for business development, innovation, and competitiveness. The formation of a knowledge ecosystem that encompasses the interaction of enterprises, research institutions, educational organisations, digital platforms, and government agencies is fundamentally changing the logic of business functioning. In such an environment, companies that are able not only to accumulate knowledge but also to manage it effectively and create new ideas, products, and business models together with partners will have an advantage.

The shift in focus from tangible to intellectual assets is driving the transformation of management strategies, organisational structures, and market behaviour. Businesses are becoming more open to partnerships, collaborations, participation in joint innovation projects, the use of cloud services, big data, and artificial intelligence. This is shaping a new economic reality in which knowledge is not only a means but also a goal of long-term growth.

The growing complexity of markets, technological transformations, increased competition, and the need for rapid decision-making are driving the need for effective knowledge management. In this context, the concept of an ecosystem, which is seen as a set of interconnected entities, processes, infrastructures, and technologies that ensure the creation, exchange, dissemination, and use of knowledge within and outside organisations, is gaining in importance.

Unlike traditional knowledge management models, the ecosystem approach focuses on openness, network interaction, the dynamics of value co-creation, and the interdependence of participants. This allows you to form flexible systems that can quickly adapt to changes in the external environment and promote innovative development. At the same time, there is a need for a deeper theoretical understanding of the structure, functions, and principles of functioning of such ecosystems, as well as in determining the factors of their effectiveness.

The list of the above and many other studies of digital transformation processes, the role of business in knowledge ecosystems, demonstrates the relevance of scientific research in this area. That is why these aspects became the subject of research in this article. Using a sociological survey conducted in March 2025, we tried to assess the system of relations

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between business, government, and higher education institutions in the implementation of urban development goals. Business is one of the key actors of the knowledge ecosystem. It can act as a subject at each stage of the knowledge chain - creation, transfer, and use. But its role is key precisely at the stage of knowledge use, at which the effectiveness of the entire ecosystem is formed.

It is worth noting that business is quite passive in forming the smart city ecosystem, which is one of the most representative in terms of the practical implementation of smart solutions. Thus, to the question "Does your company participate in the implementation of smart solutions for the city?" only 12.7% of all respondents gave a positive answer (Figure 1).

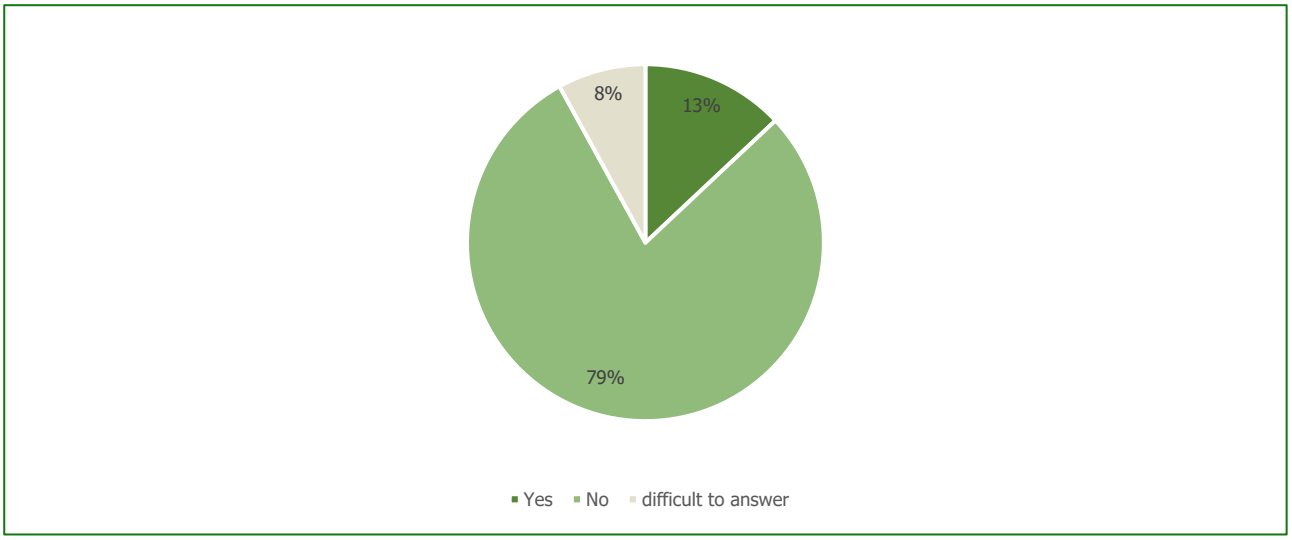
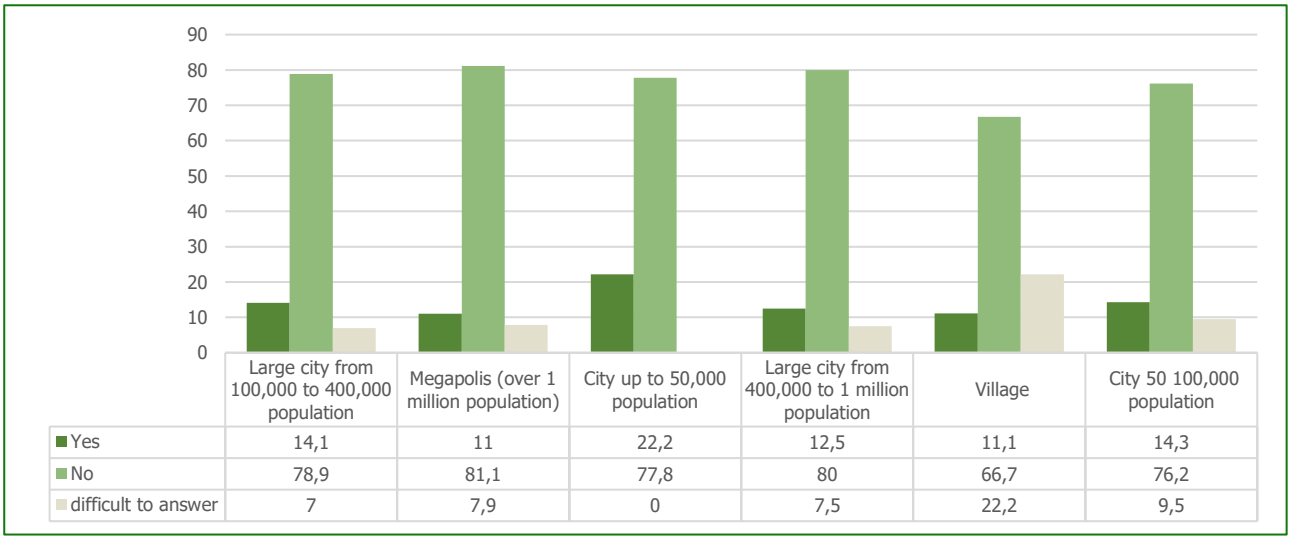


Figure 1. Level of business involvement in the practical implementation of solutions in smart cities.

Only one in-depth interview respondent said that, to some extent, his company participates in the implementation of smart solutions, which is manifested in the installation of equipment in accordance with the measurements and quality of the customers' power grids, and consulting on improving power grids. In general, both the quantitative and qualitative components of the study recorded very weak business involvement in smart solutions. It should be noted that in different cities, the structure of responses has different meanings. Interestingly, the largest number of positive responses (22.2%) was among enterprises operating in cities with a population of up to 50 thousand. 14.3% of enterprises cooperate with local authorities in cities with a population of 50 to 100 thousand, and 14.1% - in cities with a population of 100 to 400 thousand (Figure 2).



	Large city from 100,000 to 400,000 population	Megapolis (over 1 million population)	City up to 50,000 population	Large city from 400,000 to 1 million population	Village	City 50 100,000 population
Yes	14,1	11	22,2	12,5	11,1	14,3
No	78,9	81,1	77,8	80	66,7	76,2
difficult to answer	7	7,9	0	7,5	22,2	9,5

Figure 2. Distribution of respondents by location regarding the level of involvement in the implementation of smart solutions.

Despite all the challenges, the business demonstrates a rather active desire to engage in cooperation with state authorities. About a third of the business community is either companies that are already participating in joint initiatives or those that

have clear plans for future cooperation. Their goal is to jointly achieve strategic objectives aimed at developing urban infrastructure and improving living conditions. According to the survey, this figure is approximately 30%, which gives grounds to assert the growing interest of businesses in partnership for the implementation of urban improvement projects (Figure 3).

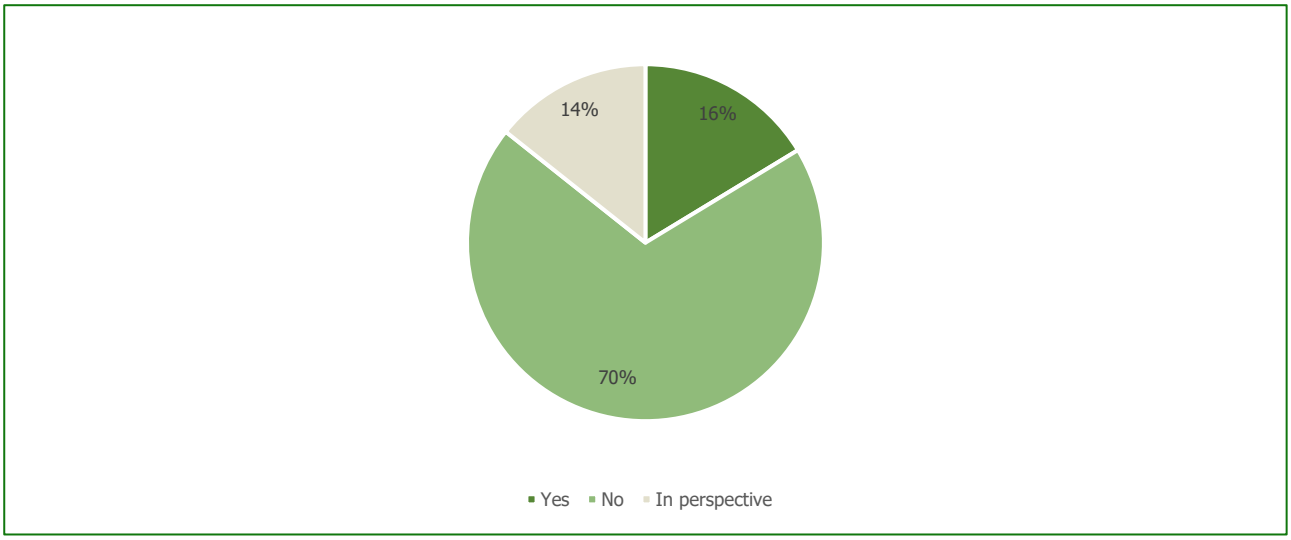
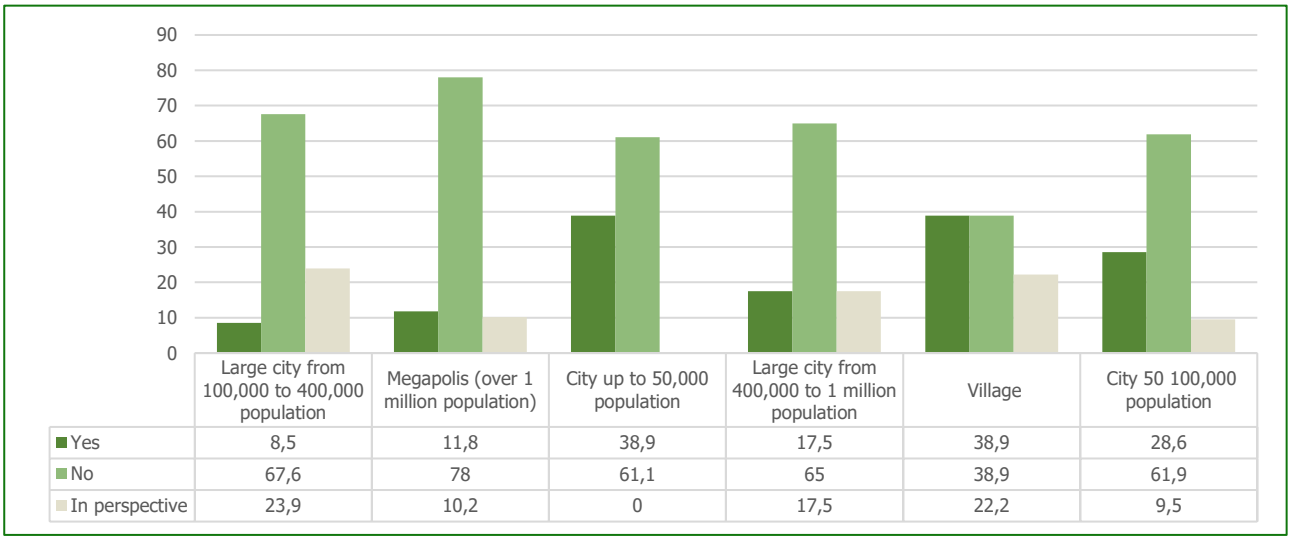


Figure 3. Distribution of respondents regarding cooperation or opportunities for cooperation with local government bodies.

There is a clear trend towards more active interaction between businesses and local authorities in smaller settlements. Enterprises in cities with a population of up to 50 thousand people, as well as in villages - 38.9% each, cooperate most actively. In cities with a population of 50 to 100 thousand inhabitants, the level of cooperation with authorities is 28.6%, while in cities with a population of 400 thousand to 1 million, this figure drops to 17.5%. This reflects the peculiarities of business involvement in the implementation of urban development goals, depending on the scale of the settlement. (Figure 4).



	Large city from 100,000 to 400,000 population	Megapolis (over 1 million population)	City up to 50,000 population	Large city from 400,000 to 1 million population	Village	City 50 100,000 population
Yes	8,5	11,8	38,9	17,5	38,9	28,6
No	67,6	78	61,1	65	38,9	61,9
In perspective	23,9	10,2	0	17,5	22,2	9,5

Figure 4. Distribution of respondents by level of interaction with local government bodies.

In the few projects that were implemented together with the city government in the context of sustainable or smart development, in only 20.7% the initiator was the city government. Business was the initiator in 48.3% of all projects, the public - in 31.0%. This indicates that the business is ready to participate in such projects and is even more active. The public also takes a more active position. This indicates that it is non-state actors - in particular, the private sector and public organizations - that are currently the driving force of innovative changes in the urban environment. This situation indicates a high potential for partnerships in the field of sustainable development, but also the need to increase the

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proactivity and leadership role of local authorities to ensure coherence, long-term vision, and effective coordination of such initiatives.

The activity of various initiators in the implementation of sustainable and smart development projects depends on the type of settlement. Moreover, local authorities are more active in cities with a population of up to 50 thousand (27.8%) and villages (27.8%), as well as in megacities with a population of more than 1 million (22.8%), which may indicate greater flexibility in small communities and strategic interest of large cities. Business is most likely to show initiative in cities with a population of 50–100 thousand (61.9%), in cities with a population of up to 50 thousand (61.1%), and in megacities (50.4%), where there is likely to be a favorable environment for investments and partnerships. The public is the initiator most often in cities with a population of 100–400 thousand people (39.4%), in villages (38.9%), and in cities with a population of 400 thousand or more, up to 1 million people, which indicates a high level of self-organization and a demand for change in an environment where government and business initiatives are less active. In general, this indicates the territorial specificity of leadership in project activities and the need for flexible, adaptive approaches to the formation of sustainable development policies at the local level.

Analyzing the respondents' answers, we can see that the activity of businesses in the implementation of various local government processes is quite low, and as a result, we do not observe involvement, which requires identifying the main factors or obstacles that affect the effective cooperation of businesses with local or state authorities. The key obstacle for businesses is financial constraints (31.7% of respondents). The second most important reason, according to 26.3% of respondents, was bureaucratic inhibition. In addition, 7.7% of respondents considered the inflexibility and obsolescence of the management system in city authorities to be an obstacle, while 3.7% indicated that business is focused on short-term rather than strategic goals. At the same time, 18.7% need more incentives from local authorities, and 12% - due to the lack of incentives from businesses. In fact, the distribution of these indicators in different settlements generally reflects the main picture (Figure 5).

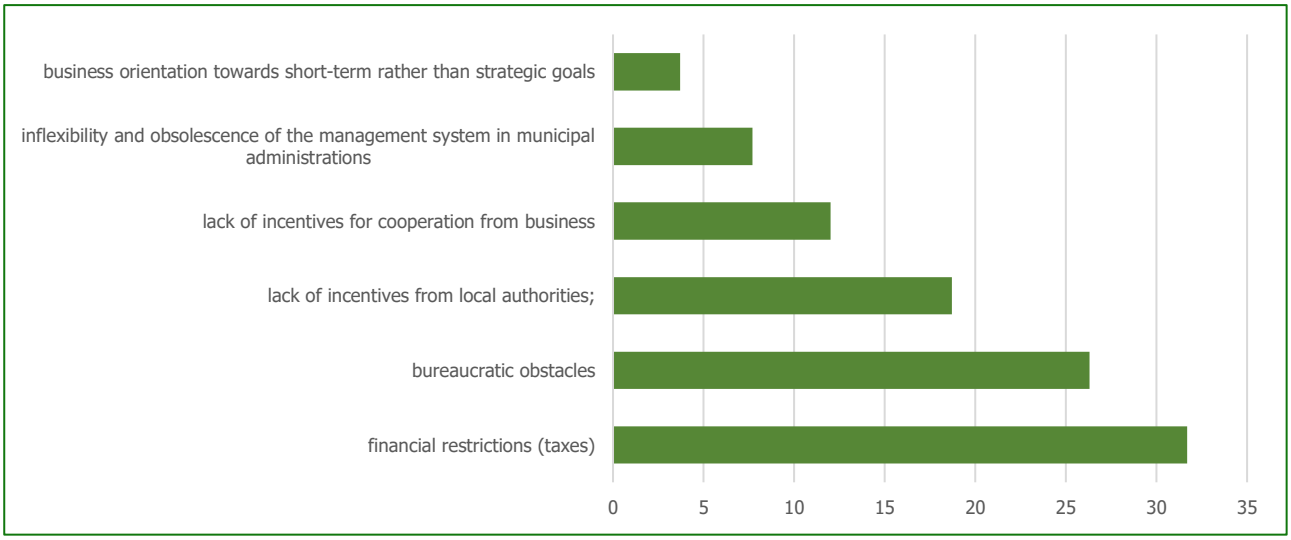

Figure 5. Key obstacles to the development of cooperation between business and local authorities.

According to the qualitative component of the study, the development of cooperation with state authorities is most hindered by corruption and the opacity of government bodies. In particular, it was indicated that state structures are often not ready for transparent cooperation, even in the case of mutually beneficial initiatives. As a result, some businesses limit their cooperation and refuse to participate if it requires the direct provision of money.

Some entrepreneurs believe that cooperation with the authorities makes sense only in the event of problems that really affect the business. One of the respondents directly noted that he does not see the point in cooperation with state bodies. Thus, for the development of business cooperation with the authorities, increasing transparency and interest of the authorities is an extremely important factor. Without ensuring a transparent system of relations and the interest of the authorities, the business does not see the point in deepening cooperation.

The "business – education – government" ecosystem works effectively when each party not only performs its functions, but is also open to cooperation, acts not in isolation, but on the basis of trust, a common strategy, and the exchange of resources. This is the basis for the development of an innovative economy, adaptive education, and effective governance.

Business is the driver of innovation. It clearly understands the needs of the market, future trends, and what kind of specialists it will need tomorrow. However, without a high-quality education system, it will be left without qualified personnel, without state support, and without incentives for development. That is why business is not only interested in cooperation, but is also increasingly becoming the initiator of partnerships with universities, specialized educational institutions, and state structures. It is ready to invest in knowledge - through internships, dual programs, and joint scientific research.

Education, in turn, ceases to be locked in its own academic capsule. Universities open their doors to entrepreneurs, change curricula, invite practicing teachers, and, importantly, begin to teach not only knowledge, but also thinking, flexibility, teamwork, and entrepreneurship. Education becomes a platform where ideas, startups, and interdisciplinary projects are born.

The government in this ecosystem plays the role of a catalyst. It depends on the policy whether the conditions for effective interaction between business and education will be created. It can either promote development by creating a legal framework, tax incentives, and grant programs, or, conversely, hinder it if it is limited to a formal approach. A successful state is one that sees business and education not as subordinates, but as partners.

However, the study confirms the weak involvement of education in the processes of the formation of a new type of economy, because, regarding cooperation between business and educational institutions, only a little more than 12% of respondents receive scientific research through cooperation with educational institutions. Also, 73.3% of respondents do not cooperate at all, and 14.3% only plan to establish cooperation in the future. The key formats of cooperation between business and educational institutions are defined as:

- industrial practice and employment of graduates (their relevance is increasing due to the shortage of personnel);
- conducting practical workshops for engineering students (by company representatives);
- providing equipment from businesses for university laboratories.

Potentially, businesses are most likely interested and could be more involved in cooperation with higher education institutions in implementing urban development goals. But on condition that it clearly understands the benefits of such cooperation for the company. Without this, it is hardly worth expecting initiatives from business in this direction.

The most active cooperation between business and higher education institutions is observed in villages, as well as in small cities with a population of up to 50 thousand inhabitants; each of these categories has exactly 27.8%. Only the third place in this rating is occupied by megacities, and their indicator is only 12.6%. Such a situation seems quite atypical, given the fact that the main part of higher education institutions is still located in large cities.

As for joint projects on sustainable or smart development with higher education institutions or scientific institutions, the distribution of responses is similar to the previous one. Around 13.0% of respondents answered positively, while 85.7% answered negatively. Again, the leaders in the implementation of joint projects on sustainable or smart development are villages (27.8%), cities with a population of up to 50 thousand people (22.2%), and megacities (12.6%). Regarding the areas that became the object of cooperation within the framework of projects between business and education, several key areas were noted. Among them, the organization of courses on the implementation of artificial intelligence, advertising, supply of equipment for higher education institutions, construction and repair work in these institutions, organization of sports events, trade, provision of internship opportunities for students and graduates, their further employment, installation of street lighting systems, development and implementation of a transport map, etc. stood out.

In joint projects with HEIs, the initiators were: city authorities (22.0%), HEIs (scientific institutions) – 14.0%, the public – 37.0%, regional authorities – 5.0%, central government – 4.3%, international donors – 17.7%. City authorities are most often the initiator of joint projects with HEIs in villages (27.8%), megacities (24.4%), and cities with a population of 50-100 thousand people. Higher education institutions (or scientific institutions) are most active in cities with a population of up to 50 thousand people (22.2%), in cities with a population of 100-400 thousand people (16.9%), and in cities with a population of 400 thousand - 1 million people (15.0%). The public is most often the initiator of joint projects in cities with a population of 400 thousand – 1 million people (50.0%), in cities with a population of up to 50 thousand people (44.4%), and in cities with a population of 50 to 100 thousand people (42.9%). Regional authorities are most active in villages (11.1%), in megacities (6.3%), and in cities with 100 – 400 thousand people (4.2%). The central government is most active in cities with a population of 500 – 100 thousand people (9.5%), 100 – 400 thousand people (7.0%), and villages (5.6%). International donors are the initiators in cities with a population of 100 – 400 thousand people (21.1%), in cities with 50 – 100 thousand inhabitants (19.0%), and in megacities (18.1%). The analysis of initiatives in the implementation of joint projects between higher education institutions (HEIs) and other entities shows the dominance of the public as the

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main source of initiatives (37.0%), which indicates a high level of activity of society in seeking cooperation with educational and scientific institutions. Municipal authorities also play an important role (22.0%), especially in rural communities, megacities, and medium-sized cities (50-100 thousand people), where there is likely to be either a shortage of expertise or a higher motivation for innovative changes.

Higher education institutions show the greatest initiative in small and medium-sized cities (up to 400 thousand people), which is probably due to closer ties with local communities and greater flexibility compared to large academic structures.

International donors show initiative mostly in medium-sized cities and megacities, which indicates their interest in systemic projects that can have a large-scale impact.

Regional authorities and the central government demonstrate the lowest level of initiative, which indicates a weak inclusion of the state administration vertical in partnership with HEIs at the level of project activities. This may indicate either bureaucratic barriers or the lack of stable mechanisms of interaction.

In general, the situation shows that local initiatives (from the public, HEIs, and local authorities) are the main engine of educational and scientific cooperation. At the same time, the potential for cooperation from state authorities and international partners remains high, but requires better coordination, openness, and simplification of procedures for involvement in such projects.

Among the main obstacles to cooperation between business and HEIs were noted: bureaucratic obstacles (30.0%), financial constraints (21%), lack of incentives (17.1%), lack of incentives from HEIs (16.0%), inflexibility and obsolescence of the management system in HEIs (7.0%), inflexibility and obsolescence of the management system in city administrations (Figure 6).

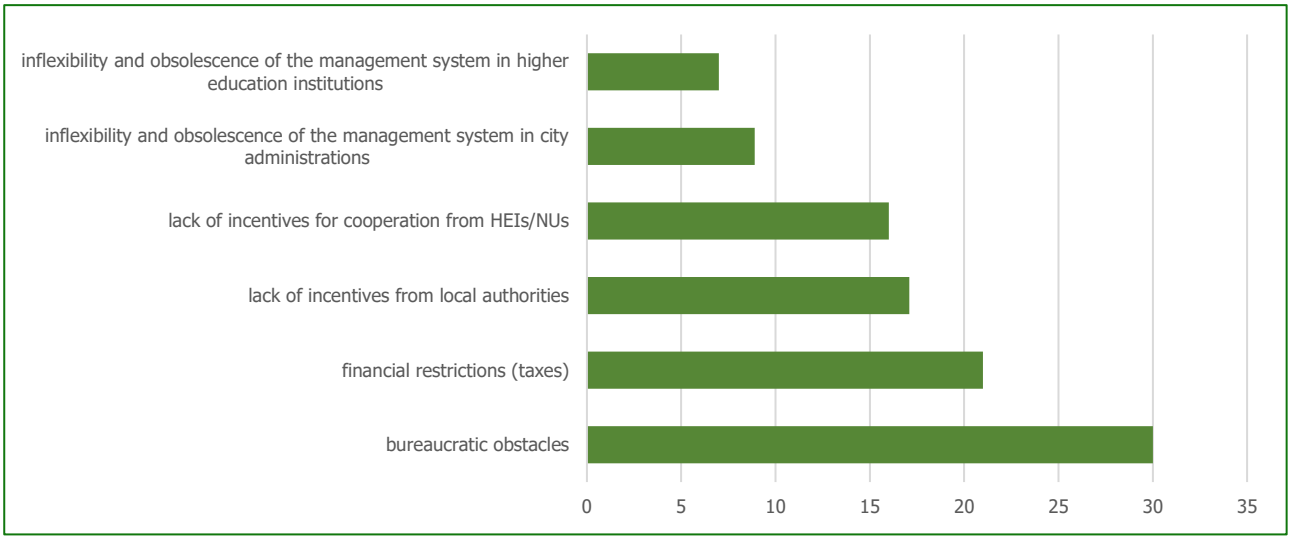

Figure 6. Key barriers to business cooperation with higher education institutions.

Analysis of the responses of respondents who did not have a positive experience of cooperation with educational institutions indicates a systemic gap in mutual understanding and motivation between business and the educational environment. The main barriers to such interaction are both subjective and structural in nature. Respondents of in-depth interviews who did not have a positive experience of cooperation with educational institutions spoke about the following obstacles:

1. Lack of understanding of how such cooperation can impact the development of the city. In particular, one of the respondents has good relations with universities, but does not see the logic in formalizing cooperation in the context of urban development, which indicates a low level of business awareness of the potential benefits of interaction with HEIs in the field of urban development and indicates the need for educational activities and successful examples of partnerships that could change perceptions.
2. Lack of need for interaction. One entrepreneur emphasized that his company does not need cooperation with HEIs, since it already has an established team of experienced specialists and operates in conditions of stable self-sufficiency in personnel and does not experience a shortage of competencies. This reduces the motivation for openness, but also demonstrates that cooperation with HEIs must be individualized and value-based in order to resonate with the interests of the business.

3. Disinterest in the development of the city, demonstrating a lack of a sense of shared responsibility or attachment to the community, which calls into question the potential of local partnerships and requires work on forming a culture of corporate social responsibility.
4. Lack of initiative. There were simply no questions or proposals for cooperation, even though the companies were not against cooperation; cooperation does not develop without an external stimulus or invitation. This indicates the importance of a proactive position on the part of the HEI or city authorities in establishing initial contacts.

It is probable that, should initiatives and communications be forthcoming from external entities (i.e., higher education institutions and relevant authorities), a significant proportion of businesses may contemplate collaborative opportunities in the context of urban development. The prevailing challenges pertain to the absence of effective communication, the paucity of initiative exhibited by all parties, and the dearth of a systematic approach to the establishment of partnerships. The identification of these barriers necessitates the implementation of strategies aimed at enhancing awareness, establishing a framework for dialogue, and showcasing exemplary cases of successful cooperation.

DISCUSSION

The fundamental impediments to effective cooperation are deeply entrenched within the systemic structure of the organisation. The development of horizontal partnerships in higher education institutions and local authorities is hindered by a number of factors. These include financial constraints, excessive bureaucracy, inflexibility, and the presence of outdated management models. The issue of deepening the interaction of all participants and forming a sustainable knowledge ecosystem aimed at developing smart solutions remains a debatable one.

Although research on building a knowledge ecosystem is found in the works of a significant number of scientists, an important aspect remains the study of business opinions regarding their needs in forming such an ecosystem, problems, and obstacles. This is especially relevant in times of war and post-war reconstruction, which should be based on a qualitatively new foundation that can be provided in the process of interaction between all participants in the ecosystem. This study is based on a survey of businesses on the possibilities of building a high-quality knowledge ecosystem, implemented in cooperation with higher education institutions and local governments. Unlike existing works, this study expands the understanding of the knowledge ecosystem in the context of problems. The problems of digitalization of business activities are studied in the works of A. Shirish, S.C. Srivastava, N. Panteli, J. O'Shanahan (Shirish, 2024), and Järvi K., Almpanopoulou A., Ritala P. (2018), however, they do not take into account the experience of rebuilding economic activity and digitalization as a tool for adjusting functioning in special circumstances. Theoretical aspects of the formation of a knowledge ecosystem are studied in the work of Penchevnko N., Nestuli Yu., Kudatsky O. (2023); however, an important aspect is the practical implementation and formation of the ecosystem in practical economic activity. Key aspects of Ukraine's post-war recovery and its development potential are considered in the works of Voytovych L., Fedyk M. (2024); however, the issue of the potential of business in ensuring the development of smart cities is left out of consideration. The basis of this work is the concept of smart cities, which is studied in the works of modern Ukrainian scientists (Sudomyr S., 2024); however, the study is expanded with practical aspects and sociological research into the place of business structures in the structure of smart cities.

CONCLUSIONS

It is evident that the level of business cooperation with both local authorities and higher education institutions is, in general, extremely low. While the survey's primary focus pertained to urban development and smart development, the data obtained nevertheless provides insights into the overall level of interaction from the business perspective. The nature of interaction is influenced by the type of city, but the overall trend remains unaltered. It has been demonstrated that smaller cities exhibit a marginally elevated degree of cooperation, a phenomenon that is presumably attributable to the relative ease with which communication can be facilitated and the presence of more intimate connections between the relevant actors. Nevertheless, sustainable partnerships between business, government, and higher education institutions (HEIs) are not common, irrespective of the type of settlement. This finding suggests the necessity for institutional reforms and modernisation of management processes. The survey revealed an acute need for additional financial resources, which is also the reason for the lack of active cooperation with other stakeholders. At a time when the business is solving the issue of survival, it has no need for additional projects. However, financing itself as an additional incentive can cause additional activity in the formation of various forms of cooperation and collaboration between all participants in building the smart city ecosystem.

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The motivation of businesses to engage in cooperative endeavours is found to be lacking, and this can be attributed to a number of factors. Firstly, there is a lack of awareness regarding the potential benefits of cooperation. Secondly, there is a lack of trust in institutions. Finally, businesses may be focusing solely on their own internal needs, rather than on the broader implications of cooperation.

There is an increasing necessity to disseminate information regarding the advantages of smart development, including for business. It is imperative that businesses recognise their potential to function as proactive agents in the promotion of smart city development, and indeed, assume a role akin to an engine for such initiatives. It is imperative for businesses to possess a profound comprehension of the advantages inherent in participating in smart initiatives, as a lack of awareness regarding these benefits will inevitably result in a corresponding lack of interest from potential participants. It is through the implementation of active educational programmes and the illustration of successful case studies that businesses can be transformed into agents of urban transformation.

It is worth noting that the above-mentioned problems may become the subject of a larger scientific discussion, namely, the search for optimal ways to qualitatively overcome the barriers to building a knowledge ecosystem. Based on the research conducted, key aspects of interaction and problems of network formation by local governments need to be studied.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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БІЗНЕС В ЕКОСИСТЕМІ ЗНАНЬ: ПОТЕНЦІАЛ ПАРТНЕРСТВА ДЛЯ СМАРТРОЗВИТКУ МІСТ

Стаття присвячена дослідженню можливостей формування екосистеми знань для українського бізнесу, яка функціонує як жива система, де взаємодія між суб'єктами та знаннями є нелінійною та складною й відбувається на всіх етапах: від їх створення до передачі та практичного використання. Кожний із цих етапів відіграє важливу роль у розвитку суспільства, науці, технологіях, бізнесі та інших царинах. Метою дослідження є аналіз форм, динаміки та бар'єрів у взаємодії бізнесу з органами місцевого самоврядування та закладами вищої освіти (ЗВО) в контексті смартрозвитку міст. Відповідно, робота спрямована на з'ясування мотивацій і причин низької зацікавленості бізнесу в співпраці з владою та освітніми установами; виявлення відмінностей у партнерстві залежно від типу населеного пункту; визначення основних інституційних і суб'єктивних бар'єрів до ефективної взаємодії; формулювання пропозицій щодо активізації участі бізнесу в просуванні ідей сталого та смартрозвитку територій. У статті проаналізовано результати опитування представників бізнесу щодо рівня взаємодії з органами державного управління, закладами вищої освіти та науковими установами в контексті міського та смартрозвитку. Установлено, що загальний рівень співпраці бізнесу з інституціями публічного сектора є вкрай низьким, незалежно від типу населеного пункту, хоча в менших містах простежується дещо активніша взаємодія, що пояснюється кращою комунікацією та локальними соціальними зв'язками. Виявлено ключові бар'єри до партнерства: відсутність мотивації, недовіра до інституцій і фокус на внутрішніх потребах бізнесу. Обґрунтовано потребу в інституційних реформах, активізації просвітницької діяльності та демонстрації ефективних практик із метою залучення бізнесу до смартініціатив як активного суб'єкта сталого розвитку міських просторів.

Ключові слова: екосистема знань, бізнес, смартмісто, міський розвиток, інституційна взаємодія, ЗВО, державно-приватне партнерство, управління змінами

JEL Класифікація: O35, R58, I23, O18